REMARKS

This response addresses the issues raised by the Examiner in the Office Action mailed June 16, 2004. Initially, Applicants would like to thank the Examiner for the careful consideration given in this case. The Claims were 14-25. Claim 14 has been currently amended. Thus, Claims 14-25 are pending in this case all to more clearly and distinctly claim Applicants' invention. In view of the above amendments and the following remarks, Applicants submit that the presently pending claims are in condition for allowance and notification of such is respectfully requested.

Currently amended Claim 14 has been amended to include electrostatic bonding for fixing the compound to the solid carrier. Support for this amendment appears for example, in the specification at page 5, lines 12-15 and page 7, lines 16-18. Accordingly, it is respectfully submitted that no new matter has been added by this amendment.

Specification

The Examiner objects to the specification because Applicants indicate that cases 10/053,326 and 09/499,717 are parent cases of this instant case but it is unclear whether Applicants claim priority for these parent cases and Applicants are required to update information for these cases because these cases have been abandoned. As the Examiner suggests, Applicants have amended the specification to update the status of Patent Application Serial Nos. 10/053,326 and 09/499,717. Applicants believe that priority is clearly claimed for the parent cases mentioned. Thus, this objection is rendered moot. Withdrawal of the present objection is respectfully requested.

Rejection Based On Rehman In View Of Collins Under 35 U.S.C. § 103(a)

The Examiner rejects Claims 14-18 and 21-25 under 35 U.S.C. § 103 (a) as being unpatentable over Rehman et al. (Nucleic Acids Research, 27, 649-655, January 1999) in view of U.S. Patent No. 5,702,896 to Collins at al. ("Collins"). Applicants respectfully traverse this rejection.

The Examiner acknowledges that Rehman does not disclose heating a solid support after a hybridization assay, such as washing the slide at high temperature as specified in Claims 14 and 16. However, the Examiner asserts that Collins teach heating a solid support after a hybridization assay, to reduce non-specific binding in a hybridization assay by washing non-specific probes. Thus, the Examiner concludes that it would have been *prima facie obvious* to one having ordinary skill in the art at the time the invention was made to have heated the carrier after the steps of washing and drying the carrier as recited in claims 14 and 16 in view of the prior art. Applicants respectfully disagree.

To establish obviousness of a claimed invention, all claim elements must be disclosed, taught or suggested by the prior art. We agree with the Examiner that Rehman does not disclose heating a solid support after a hybridization assay, such as washing the slide at high temperature as specified in Claims 14 and 16. The Examiner states that Rehman teaches immobilization of acrylamide modified oligonucleotide on a carrier by co-polymerization. The Examiner then states that the spotted slides are placed in a humid nitrogen atmosphere at room temperature for 5 minutes to allow polymerization. This shows that the immobilization of acrylamide oligonucleotide on a carrier is attained by covalent bonding.

As stated above, Claim 14 has been currently amended to include that electrostatic bonding is used for fixing the compound to the solid carrier. The present invention discloses a method of fixing an oligonucleotide or a polynucleotide to a solid carrier having the following steps of spotting an aqueous solution containing a hydrophilic polymer and a compound selected from the group consisting of the oligonucleotide and polynucleotide onto the solid carrier, where the compound is fixed to the solid carrier by electrostatic bonding, washing the carrier, drying the carrier, and heating or exposing to radiation the carrier. The present invention uses electrostatic bonding for fixing of oligonucleotide to the solid carrier which differs from the covalent bonding taught by Rehman. It is known that electrostatic bonding is relatively weak and easily broken by variation of environmental conditions. The hydrophilic polymer in the present invention reinforces the electrostatic bonding between the probe compounds (i.e., oligonucleotide or polynucleotide) and the solid carrier, so that the produced DNA chip can be favorable employed for detecting a DNA fragment complementary to the probe compound. See page 5, lines 12-15 and page 7, lines 16-18.

In addition, Rehman does not teach the heat treatment or radiation treatment of the solid carrier that contains a hydrophilic polymer reinforcing the electrostatic bonding between the probe compound and the solid carrier and that the un-fixed probe compound and excessive hydrophilic polymer is washed from the carrier. See page 9, lines 26-36 and page 10, lines 1-5. This is done so that a favorable employable DNA chip in which the probe compound is well fixed to the solid carrier by electrostatic bonding is created. See page 9, lines 26-36 and page 10, lines 1-5.

In regards to Collins, Collins discloses a method for improving the sensitivity of hybridization assays that reduce non-specific binding and non-specific hybridization. See Abstract. Collins teaches washing at high temperatures. However, this is unlike the present invention which employs the continuous procedures of washing, drying and heat treatment.

Since Rehman does not teach or suggest that electrostatic bonding is used for fixing the compound to the solid carrier and the heat treatment or radiation treatment of the solid carrier, the Applicants believe that the present invention is not obvious over the teaching of Rehman. In addition, Collins does not teach or suggest the continuous procedures of washing, drying and heat treatment of the carrier. Moreover, Collins does not teach or suggest that electrostatic bonding is used for fixing the compound to the solid carrier. Thus, the Applicant believes that the amended invention is not obvious over the teaching of Rehman in view of Collins since Rehman and/or Collins do not teach, disclose or suggest the present claims. Moreover, one skilled in the art would find nothing in Rehman or Collins alone or in combination that would disclose, teach or suggest the claimed invention or any reason for making it. Further, there is no motivation to combine the references in such a way to get the claimed invention. Therefore, an obvious rejection under 35 U.S.C. §103 (a) is improper.

Rejection Based On Rehman In View Of Collins And Further In View Of Brown Under 35 U.S.C. § 103(a)

The Examiner rejects Claim 19 under 35 U.S.C. § 103 (a) as being unpatentable over Rehman et al. ("Rehman") in view of U.S. Patent No. 5,702,896 to Collins at al. ("Collins")

and further in view of U.S. Patent No. 5,807,522 to Brown et al. ("Brown"). Applicants respectfully traverse this rejection.

The Examiner acknowledges Rehman and Collins do not disclose to spot nucleic acids onto a glass sheet slide pretreated with poly-L-lysine as recited in Claim 19. However, the Examiner asserts that Brown does teach to spot nucleic acids onto a glass sheet slide pretreated with poly-L-lysine. Thus, the Examiner states that in the absence of unexpected result, it would have been *prima facie obvious* to one having ordinary skill in the art at the time the invention was made to have spotted nucleic acids onto a glass sheet slide pretreated with poly-L-lysine in view of the prior art. Applicants respectfully disagree.

To establish obviousness of a claimed invention, all claim elements must be disclosed, taught or suggested by the prior art. As stated above, Rehman and/or Collins do not disclose, teach or suggest a method of fixing an oligonucleotide or a polynucleotide to a solid carrier including fixing the compound to the solid carrier by electrostatic bonding, washing the carrier, drying the carrier, and heating or exposing to radiation the carrier. In addition, Applicants agree with the Examiner that both Rehman and Collins do not disclose, teach or suggest to spot nucleic acids onto a glass sheet slide pretreated with poly-L-lysine as specified in Claim 19.

Brown discloses a method of fabricating microarrays of biological samples. See Abstract. However, Brown does not teach or suggest do not disclose, teach or suggest a method of fixing an oligonucleotide or a polynucleotide to a solid carrier including fixing the compound to the solid carrier by electrostatic bonding, washing the carrier, drying the carrier, and heating or exposing to radiation the carrier. Therefore, the Applicants believe that the amended invention is not obvious over the teaching of Rehman in view of Collins and further in view of Brown since Rehman, Collins and/or Brown does not teach, disclose or suggest the present claims. Moreover, one skilled in the art would find nothing in Rehman, Collins or Brown alone or in combination that would disclose, teach or suggest the claimed invention or any reason for making it. Further, there is no motivation to combine the references in such a way to get the claimed invention. Therefore, an obvious rejection under 35 U.S.C. §103 (a) is improper.

Rejection Based On Rehman In View Of Collins And Further In View Of Shi Under 35 U.S.C. § 103(a)

The Examiner rejects Claims 14-18 and 21-25 under 35 U.S.C. § 103 (a) as being unpatentable over Rehman et al. ("Rehman") in view of U.S. Patent No. 5,702,896 to Collins at al. ("Collins") and further in view of U.S. Patent No. 5,919,626 to Shi et al. ("Shi"). Applicants respectfully traverse this rejection.

The Examiner acknowledges Rehman and Collins do not disclose to spot nucleic acids onto a glass sheet slide pretreated with a silane coupling agent having an epoxy group as recited in Claim 20. However, the Examiner asserts that Shi does teach to spot nucleic acids onto a glass sheet slide pretreated with a silane coupling agent having an epoxy group. Thus, the Examiner states that in the absence of unexpected result, it would have been *prima facie obvious* to one having ordinary skill in the art at the time the invention was made to have spotted nucleic acids onto a glass sheet slide pretreated with a silane coupling agent having an epoxy group in view of the prior art. Applicants respectfully disagree.

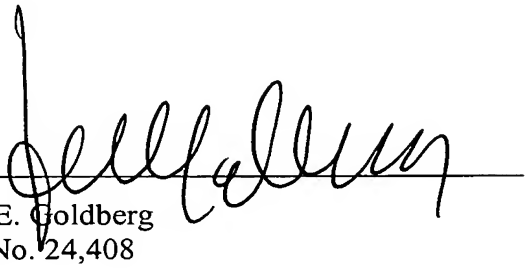
To establish obviousness of a claimed invention, all claim elements must be disclosed, taught or suggested by the prior art. As stated above, Rehman and/or Collins do not disclose, teach or suggest a method of fixing an oligonucleotide or a polynucleotide to a solid carrier including fixing the compound to the solid carrier by electrostatic bonding, washing the carrier, drying the carrier, and heating or exposing to radiation the carrier. In addition, Applicants agree with the Examiner that both Rehman and Collins do not disclose or teach or suggest that to spot nucleic acids onto a glass sheet slide pretreated with a silane coupling agent having an epoxy group as recited in Claim 20.

In regards to Shi, Shi discloses a method of immobilization of oligonucleotides by incubation with a silane containing or silane-treated solid phase. See Col. 5, lines 42-45. However, Shi does not teach or suggest do not disclose, teach or suggest a method of fixing an oligonucleotide or a polynucleotide to a solid carrier including fixing the compound to the solid carrier by electrostatic bonding, washing the carrier, drying the carrier, and heating or exposing to radiation the carrier. Thus, the Applicants believe that the amended invention is

not obvious over the teaching of Rehman in view of Collins and further in view of Shi since Rehman, Collins and/or Shi does not teach, disclose or suggest the present claims. Moreover, one skilled in the art would find nothing in Rehman, Collins or Shi alone or in combination that would disclose, teach or suggest the claimed invention or any reason for making it. Further, there is no motivation to combine the references in such a way to get the claimed invention. Therefore, an obvious rejection under 35 U.S.C. §103 (a) is improper.

In view of the remarks presented herein, it is respectfully submitted that the present application is in condition for final allowance and notice to such effect is requested. If the Examiner believes that additional issues need to be resolved before this application can be passed to issue, the undersigned invites the Examiner to contact him at the telephone number provided below.

Dated: December 16, 2004

By 

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